

DEPTH OF SNOW REMAINING ON GROUND ON 15TH AND AT CLOSE OF MONTH.

No reports have been received of snow on ground on the 15th. Chart v shows that the only snow reported on the ground at the close of the month was noted at stations in the extreme northern part of the northern peninsula of Michigan, where it varied in depth from one-half inch to four inches.

MONTHLY SNOWFALLS (inches and tenths) APRIL, 1889.

Below are given all monthly snowfalls of three inches, or more, and in states and territories where the maximum depth was below that amount, the station reporting the greatest is given:

California.—Cisco, 21; Summit, 19; Emigrant Gap, 12; Truckee, 10; Fort Bidwell, 6.5; Dunsmuir and Susanville, 6; Boca, 3. *Colorado*.—Breckenridge, 45; Leadville, 31; Alma, 17.5; Ranch, near Como, 14; Fraser, 10.5; Palmer Lake, 8.5; Grand Lake, 7; Idaho Springs, 6.1; Georgetown, 6; Denver (Jesuit College), 4.5; Saguashe, 4; Husted, 3.5; Forts Collins and Crawford, 3. *Connecticut*.—Hartford, 3. *Dakota*.—Spearfish, 10; Fort Pembina, 3. *Indiana*.—Angola, 0.4. *Kansas*.—Colby, 2. *Kentucky*.—Ashland, 1.5. *Maine*.—Kent's Hill, 9; Cornish, 8; Calais and Lewiston, 6; Belfast, Mayfield, and West Jonesport, 5; Gardiner and Orono, 4. *Maryland*.—Cumberland, 10; Mount St. Mary's College, 3.8. *Massachusetts*.—Groton, 6; Gilbertville, 5; Lawrence and Rowe, 3. *Michigan*.—Atlantic, 12; Calumet, 9; Washington, 6.8; Deer Lake, 5.5; Lathrop, 5.2; Bellaire, 5; Harrisville and Roscommon, 4; Sand Beach, 3.5; Hillman, Traverse City, and Ypsilanti, 3. *Minnesota*.—Pine River, 5.5; Lake Winnibigoshish, 3.4. *Montana*.—Virginia City, 4.5. *Nebraska*.—Hay Springs, 3. *Nevada*.—Ruby Hill, 10; Wellington, 4; Toano, 3.2. *New Hampshire*.—Newton, 14; West Milan, 8; Stratford, 7; Manchester a and Plymouth, 6; North Sutton and Shaker Village, 5; Berlin Mills, Hanover, Manchester b, North Chesterfield and North Conway, 4; Concord and Walpole, 3. *New Jersey*.—Egg Harbor City, trace. *New Mexico*.—Las Vegas, 0.5. *New York*.—Canton, 8.3; Queensborough, 8; Barnes' Corners, 7; Saranac Lake, 6; Plattsburgh Barracks, 4.5; Constableville and North Hammond, 4; Number Four, 3.4; Humphrey and Le Roy, 3.2. *North Carolina*.—Soapstone Mountains, trace. *Ohio*.—Cleveland, 2.2. *Oregon*.—Fort Klamath, 7; Siskiyou, 5. *Pennsylvania*.—Somerset, 12.5; McConnellsburch, 12; Rimersburgh, 9; Columbus, Corry, and Meadville, 6; Charlesville, 5.2; Allegheny Arsenal, 5.1; Gram-pian Hills, 5; Greenville, 3. *Vermont*.—Strafford, 11; Lunenburg, 6; East Berkshire, 4.4; Burlington, Chelsea, Jacksonville, and Saxton's River, 4. *Virginia*.—Alum Springs, 11.5; Dale Enterprise, 8; Bolar, 6; Lynchburgh, 4; Fort Myer, 3. *West Virginia*.—Rockport, 7. *Wisconsin*.—Hayward, 3. *Wyoming*.—Fort Bridger, 20.8; Fort McKinney, 4.3; Camp Sheridan, 3.8; Fort Washakie, 3.

BLACK SNOW.

There was a general snowfall on the 3d throughout the northern part of New York state, during which, for a short time, the snow was of a dark color, covering the counties of

Lewis, northern Herkimer, southern Franklin, and the north-western part of Essex, and probably Hamilton. From the reports of forty-nine towns it seems that the "black snow storm" extended from Ava, in Oneida Co., over a distance of one hundred and twelve miles in a northeast direction, to Wilmington, Essex Co., and from Pitcairn, Saint Lawrence Co., extending southward some thirty miles to Ava. The "black snow" fell soon after the passage of the storm-centre which crossed the state on the 3d. The area of snow of darkest color was nearly central over Lewis County. At Copenhagen "a pan full of snow, when melted, gave a teaspoonful of very fine ashes," and at Saranac Lake about one-half inch of "black snow" fell over the white snow which preceded it.

A specimen of the "black snow" was examined microscopically, and it appears that the sediment collected is finely divided earth. A comparison of this sediment with that from ashes shows that the snow was not discolored by ashes, which is further confirmed by the large number of vegetable fibers in the black snow, the absence of forest fires to the windward of the region affected, and the close resemblance of the "black snow" sediment to an artificial sediment made from humus procured near the office of the New York Central Station. These facts, together with those which obtained at the time of the passage of the storm-centre, make it probable that soil was excavated by some whirlwind, and, after being scattered by the storm, it was deposited over the counties mentioned as the snow was formed.—*New York State Weather Service Report*.

HAIL.

Descriptions of the more severe hail-storms of the month are given under "Local storms." Hail was also reported during the month as follows:

1st, Ind., Mass., Oregon. 2d, Md., N. H. 3d, Mass., N. H., N. Y., Vt. 5th, Mass., N. Mex. 6th, Kans., La., Mo., N. C., Va. 7th, Kans., Mass., Mo., Nebr. 8th, Mass., N. J., Tex. 9th, Ariz., Cal., Miss. 10th, N. Mex. 11th, Colo., Ill., Iowa, Kans., Miss., Mo., Nebr., N. Y., Ohio, Tex. 12th, Ala., Ill., Ind., Ky., Mo., N. Mex., Ohio, Oregon, Pa., S. C., Tenn., W. Va., Wyo. 13th, Ala., Cal., Ga., Ill., Iowa, La., Mass., N. C., Ohio, Oregon, Tenn., Tex., Wash. 14th, Ala., Ga., Miss., Oregon, Tenn., Wash., Wyo. 15th, Cal., Miss., Ohio, Tex. 16th, Colo., Kans., Nebr. 17th, Kans., Mont., Wyo. 18th, Dak., Ill., Iowa, Kans., Mo. 19th, Ind., Tex. 20th, Mass., N. H., N. J., Tex. 21st, Mass., N. H., N. Mex. 22d, Dak. 23d, Ala., Ill., Iowa, Kans., Mo. 24th, Ga., Me., Miss., Ohio, S. C., Tenn. 25th, Fla., Ga., N. C., Ohio, S. C., Tenn. 26th, Conn., Dak., Kans., Tex. 27th, La., Wis. 28th, Colo., Ind. T., Kans., Nebr., N. C., S. C., Tenn. 29th, Ind. T., Kans., Nebr., N. C., S. C., Tenn. 30th, Ala., Dak., La., Tex.

SLEET.

Sleet was reported during April as follows: 1st, Mass., N. H., N. Y., Ohio. 2d, Conn., Me., Mass., Minn., Wis. 3d, Conn. 6th, Nebr., N. C. 8th, Conn. 10th, N. Mex. 13th, Mont. 14th, Idaho, Mont. 17th, Nebr. 24th, Nebr., Wis. 28th, Nebr.

WINDS.

The prevailing winds during April, 1889, are shown on chart i by arrows flying with the wind. In New England, the east Gulf states, upper Lake region, northeastern, middle, and southeastern slopes of the Rocky Mountains, and the middle plateau region the winds were variable; in the middle Atlantic states, the Ohio Valley, and Tennessee they were mostly from northeast to northwest; in the south Atlantic states, the lower lake region, and the northern and southern plateau regions, northwest to southwest; in Florida, north to west; in the west Gulf states and Washington Territory, southerly; in the extreme Northwest, north to northeast; in

Oregon, northwest; on the middle Pacific coast, west to southwest, and on the south Pacific coast, west.

HIGH WINDS (in miles per hour).

Maximum velocities of fifty miles, or more, per hour, other than those given in the table of miscellaneous meteorological data, have been reported as follows: Hatteras, N. C., 68, n., 8th; Valentine, Nebr., 52, nw., 2d.

LOCAL STORMS.

The following descriptions of storms generally refer to disturbances which attended the passage of areas of low pressure traced on chart i:

2d. Dakota.—Fort Sully: the wind suddenly backed to northwest at 10 a. m. and increased in force. It blew with great violence from noon until 8 p. m., attaining a maximum velocity of sixty miles per hour; fences and out-houses sustained serious damage. The high wind raised heavy clouds of sand and small pebbles, causing the sky to appear as though covered by dense stratus clouds, and in the streets one could scarcely see one hundred yards. Huron: fresh southerly winds prevailed in the morning. The wind increased from the northwest after 12 m., becoming a gale of forty to sixty miles per hour, with occasional sudden and heavy gusts, which continued until after 10 p. m., when it began to abate, subsiding at 1 a. m. of the 3d to a velocity of thirty miles per hour. In the afternoon atmospheric electricity was very strong, necessitating the cutting out of all wires at the telegraph offices. The superintendent of the railway telegraph system found it impossible to remove the "ground" of one wire, although the battery was detached, efforts in that direction resulting in the ignition of the wood-work where the wire entered the office. Telegraphic communication was entirely cut off until late at night. At 2 p. m. prairie fires started in the country, some from no known cause. It is asserted by trustworthy farmers that the barbs of fence wire emitted showers of sparks at intervals, and several report that fires started at the foot of posts supporting the wires. Many report that the flames rose fifty feet in the air. All combustible matter appeared to be highly susceptible of ignition; in many cases buildings protected by from fifty to one hundred rods of ploughed ground were consumed. No perceptible interval of time elapsed from the moment the structures were on fire until their complete envelopment. Huron was several times threatened, and only strict vigilance and hard work kept the fires from entering the corporation limits. A few out-houses were upset by the wind. In some places in the country newly sown grain was blown out, and, together with the sand, laid in windrows at nearly right angles to the direction of the wind.

3d. Maryland.—Baltimore: a cloud of dark violet color, moving from west to east, passed over the city with a whirling sound accompanied by light rain at 5 p. m. The wind manifested a gyratory movement and blew at the rate of thirty-two miles per hour from the west. Considerable injury was done to property in this city and vicinity; estimated damage, \$12,000. **New Jersey.**—Bridgeton, Cumberland Co.: a storm, moving from a southeasterly direction, struck the southern portion of this city at 6 p. m. doing considerable damage. A new house and two large buildings were demolished, and the East Lake Woolen Mill was unroofed, telephone poles were snapped off, and many wires were grounded.—*Report of W. S. Lambert, Port Norris, N. J.*

5-6th. Virginia.—Brockville, Spottsylvania Co.: a thunder-storm moving from north to northeast, accompanied by vivid lightning, high wind, and heavy rain, began during the night 5-6th; was followed by hail and blinding snow during the morning of the 6th, and continued until 5 p. m. same day. Trees were blown down, stock killed by falling sheds, and other damage done by the wind. Snow fell to a depth of eighteen inches.—*Report of Annie Parker, P. M.*

6th. District of Columbia.—Washington City: the day opened with heavy rain, which changed to snow at 8.35 a. m., and continued falling very heavily until it changed to rain at 5 p. m. High wind prevailed throughout the day; maximum velocity forty-two miles per hour from the northeast. The snow melted and settled as it fell; four inches being the greatest depth at any time during the day. The total precipitation was 2.23 inches, all of which fell in thirteen hours and forty minutes. Heavy thunder occurred at 10.15 a. m., and was heard several times until 2.30 p. m. **Virginia.**—University of Va.: hail began at 7 a. m. and was shortly followed by heavy snow and high wind from the north, which continued until 9 p. m. Several buildings were blown down, trees uprooted, and fences demolished. Telephone wires which were heavily

loaded with moist snow broke under its weight.—*Report of James Wearmouth, Voluntary Observer.*

6-7th. Virginia.—Norfolk: a violent storm set in 9.55 p. m., 6th, and very high wind continued during the night and following day, attaining a maximum velocity of fifty-five miles per hour from the north at 11.20 p. m., 6th. The storm surpassed in violence any that have occurred in this section within the memory of man. Numerous buildings were unroofed, superstructures torn away, telegraph lines prostrated, etc. During the night of the 6-7th the situation in this city was appalling; the electric light wires broke and left the city in darkness, except when flames shot up from burning docks and storehouses which caught fire from the quick-lime stored therein when reached by the rising water. Early on the morning of the 7th the water from the harbor overspread the city, damaging property to the estimated amount of one million dollars. The naval dry dock was broken into by the rising water and the United States s. s. "Pensacola," undergoing repairs therein, was sunk. Telegraphic communication with all points was severed; no mails arrived, owing to wash-outs on railroads, and no vessels ventured out on account of the storm. In this harbor vessels were torn from their moorings and cast upon the land total wrecks. The loss of life and damage to shipping in this vicinity, due to the storm, is unprecedentedly large. Cape Henry: a severe northeast storm began 9.30 p. m., 6th, and at 10.35 p. m. it had attained a velocity of seventy-five miles per hour. The wind increased in force and became so violent that at 1.30 a. m., 7th, the anemometer cups were blown from their position. At this time the wind was blowing at the rate of one hundred and five miles per hour, and during the night of the 6-7th it increased in violence. It is estimated that it reached a velocity of one hundred and twenty miles per hour after the anemometer cups had been carried away. The sea was unusually rough and the surf surrounded the building of the Signal Office, which is two hundred yards from the ordinary high water mark. Much damage resulted to sailing vessels during the storm. Richmond: the severe storm which prevailed during the 6th and the night of the 6-7th caused considerable damage to property in this city. The electric cars were obliged to suspend operation about 8 p. m., 6th, their wires, like those of the telegraph, telephone, and fire-alarm services, having been disabled by swaying poles, falling limbs of trees, etc. Reports from Williamsburgh, Ashland, West Point, Keswick, and Stanton show that the storm and flood at these places were unusually severe and destructive to property during these dates.—*The Richmond Dispatch, April 8th, 1889.* **North Carolina.**—Raleigh: brisk wind from the south began 7.30 a. m., 6th, and increased in force until 1 a. m., 7th, when the maximum velocity, forty-five miles per hour, was recorded. Light snow fell from 4.30 p. m. to 9.30 p. m., 6th.

7th. North Carolina.—Kitty Hawk: a severe storm accompanied by heavy rain began 5 a. m. The wind increased in force and attained a velocity of eighty miles per hour from the north at 10.30 a. m. The sea washed over the beach and around the buildings of the Signal Office and Life-Saving Station, the water being knee deep between the buildings. Telegraphic communication was cut off, as was also the telephonic communication north. Several fishing craft and other sailing vessels are reported wrecked. Reports from Nags Head, Dare Co., state that the storm was very destructive in that section; two large houses were washed away or blown into the sound; all bath houses were washed down and strewn along the beach; over sixty head of cattle were drowned between that point and Oregon Inlet, and the Oregon Inlet cable was washed away. Hatteras: a severe storm set in at 7 a. m. and continued throughout the day; the wind attained a maximum velocity, eighty miles per hour from the north, at 6.22 p. m. Several vessels were blown ashore, and one, the schooner "Nellie Potter," of Washington, N. C., became a total loss. **Missouri.**—Kansas City: a severe thunder-storm accompanied by rain passed over this city between 8.15 p. m. and 11.25 p. m.; the flashes of lightning were almost blinding and the peals

of thunder very loud. Several buildings in this city were struck by lightning, notably the Grand Opera House, which was damaged to the extent of \$2,000, and telephone and telegraph wires were burned out. Several houses and barns in the surrounding country were struck by lightning.

10th. New Mexico.—Santa Fé: a thunder-storm, moving from east to northeast, prevailed during a part of the forenoon, and sleet, rain, and snow occurred at intervals during the day until 5.30 p. m. Hail-stones one and one-half inch in diameter almost covered the ground.

11th. Iowa.—Dysart, Tama Co.: a storm moving in a northeasterly direction passed over this city 4 p. m. demolishing some buildings and unroofing others. The damage done is estimated at \$1,000.—*Tampa Free Press*.

12th. Indiana.—Indianapolis: a hail-storm accompanied by heavy rain occurred between 5.20 p. m. and 6.40 p. m.; some of the hail-stones were very large and measured over one inch in diameter. No high wind accompanied the storm and no damage has been reported. *Ohio.*—Saint Clairsville, Belmont Co.: a severe wind storm accompanied by rain began 5.30 p. m. A school house was demolished and numerous other buildings were unroofed or otherwise damaged by the wind. Powhattan, same county: the storm which reached this city at 6 p. m. was more destructive here than in any other part of the county. One man was killed. Several large buildings were badly wrecked and others seriously damaged.—*Belmont Chronicle*. *Tennessee.*—Riddletown, Smith Co.: one of the severest thunder-storms experienced at this place for years prevailed during the afternoon. The storm was accompanied by very heavy rain, large hail, and violent gusts of wind from the southwest. The heavy rain did much damage by washing hill-side lands, flooding bottom lands, etc.—*Report of Voluntary Observer*. *Nashville:* a thunder-storm moving from west to east passed over this city between 3.55 p. m. and 5.15 p. m. It was accompanied by heavy rain, large hail, and high west wind. Some of the hail-stones were about one-half inch in diameter and caused considerable damage to fruit trees.

West Virginia.—Tannery, Preston Co.: a violent thunder-storm moving from northwest to southeast passed over this place at 7 p. m. The storm was about ten or fifteen miles wide and was very destructive, unroofing several buildings, leveling fences, timber, etc.—*Report of G. H. Trembly, P. M.*

13th. Texas.—Weimar, Colorado Co.: a very severe storm struck this place at 7.15 p. m. and lasted twenty-five minutes. Two churches were blown down and one was lifted entirely from its blocks. Considerable injury was done to other structures in the city. The storm started with an east wind and ended with a terrible "southwester," accompanied by heavy rain.—*Galveston News, April 15*.

14th. Alabama.—Montgomery: a severe thunder-storm began 1.45 p. m. and ended 7.10 p. m. It was accompanied by intense lightning, heavy rain, and high wind. Three persons were killed by lightning; houses were unroofed or otherwise damaged, and trees and fences were blown down.

16th. Kansas.—Wellington, Sumner Co.: one of the severest wind and rain storms that ever visited this section passed over this place at 11 p. m. A number of houses were unroofed or blown down, trees prostrated, and crops damaged. Large hail-stones fell.—*Denver Times, April 17*.

18th. Dakota.—Huron: a thunder-storm accompanied by rain and small hail passed over this city in the afternoon. At about 12.15 p. m. the lightning struck the Chicago and Northwestern Railway hotel, tearing a hole in the roof and destroying all the electric light wires. Sometime after the thunder-storm had passed three separate tornado funnel-clouds were observed about ten miles west from here, moving slowly south. They were narrow, and at no time while under observation did they reach the ground. They passed out of view by contraction into a dirty, murky-looking horizontal cloud. People living in the vicinity where the clouds were observed report that something like a cloud-burst occurred; the rain fell in torrents accompanied by small hail for about ten minutes, filling sloughs and low places. *Illinois.*—Hinckley, DeKalb

Co.: a storm passed over the northern section of this town during the evening, demolishing several buildings and unroofing others in its path. The storm traveled in a zig-zag north-easterly direction, and its track was from one hundred and seventy-five to two hundred and fifty feet wide. The damage is estimated at over \$10,000.—*Sycamore City Weekly, April 25*.

20th. Texas.—Rice, Navarro Co.: a very severe storm accompanied by vivid lightning and loud thunder passed over this place 11 p. m. Four miles north of this place one house was struck by lightning. Hail as large as hen eggs fell in some places. The rainfall was excessive.—*Report of Texas State Weather Service*.

23-24th. Pennsylvania.—Erie: a wind storm set in 11.08 p. m., 23d, and ended 3.28 p. m., 24th. Maximum velocity, forty-two miles per hour, occurred 3.28 p. m., 24th, and an extreme velocity at the rate of sixty miles an hour was recorded for one minute same date. Numerous persons were injured by debris in the air, and fruit, shade, and ornamental trees in the city sustained serious damage.

24th. Georgia.—Atlanta: a thunder-storm accompanied by heavy rain and hail began 5.12 p. m. and ended 5.24 p. m. During that time 1.10 inches of rain fell, flooding many of the buildings and causing other damage in the city. The hail-stones were about the size of hazel nuts, and some few were larger and covered the ground to a depth of one-fourth inch. The breadth of the hail storm was not over a mile. The wind for a short time was very high. *Minnesota.*—Duluth: heavy rain prevailed during the night. The wind backed from northeast to northwest, increasing in force, and blowing a heavy gale from 8.25 a. m. to 4.57 p. m. Maximum velocity, thirty-four miles per hour from the northwest, at 2.30 p. m. The heavy rain caused several minor washouts and caving in of sewers and sidewalks in this city. It is reported that two vessels were blown ashore this morning on Gull Rock of Michigan Island, near Ashland, Wis., and that both vessels sustained considerable damage. It is also reported that 20,000,000 feet of logs, worth over \$100,000, were lost by the boom breaking and the logs being driven out into the lake, at Chequamegon Bay, during the gale.

WATER-SPOUT.

Chief Officer C. L. Calloway, of the s. s. "Santiago," Capt. J. B. Allen, commanding, forwards the following interesting report of a water-spout encountered by that vessel:

"April 29th, at about 6.30 a. m., with Royal Island, one of the Bahamas, bearing about south, distant four miles, and the wind sse., and weather partly cloudy, observed a water-spout forming on starboard bow (ship heading sw.), and moving in direction of steamer from the nw. On account of its close proximity was about to steer clear of it, when I observed it breaking about thirty yards from ship on starboard bow. Immediately afterwards the steamer passed through the outer edge of the whirlpool, the diameter of which was judged to be fifty to seventy yards. On passing through the outer edge observed the centre to be hollow, with the water circling from west to east, or against the sun, and the water that fell on deck was very salt and the drops as large as a fifty-cent piece. During the few seconds of our passage through the wind blew with force of about thirty to thirty-five miles per hour, but did not observe any calm in the centre of water-spout. The water arising resembled an inverted fountain. After clearing the water-spout the wind resumed its original force, about fifteen miles per hour. The appearance of the clouds above and around the spout was very ragged and much disturbed, similar to those in a thunder-storm, and the various changes among them were very rapid. They ascended, descended, and broke away from each other after the water had been absorbed into them. The water was whirling very rapidly for several minutes after the break, showing what tremendous circular force there must have been. The water-spout did not affect the steering of the ship, so that if there was any current it must have been circular and confined to the centre. The barometer fluctuated about .01 or .02 of an inch."